Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] 1. A method for spray forming an article, said method comprising:

spraying a plurality of metal streams upon a spray-forming model and thereby forming a spray formed article, each of the plurality of metal streams being composed of moltenized droplets, and as between the plurality of metal streams, each is composed of different constituent elements;

controlling application conditions of the plurality of metal streams upon exposed receiving surfaces during the spraying process so that individual metal droplets of the plurality of metal streams remain substantially segregate through out solidification and thereby establish the spray formed article composed at least partially of a psuedo-alloy;

controlling relative proportions between the plurality of metal streams composed of different constituent elements in a manner that institutes prescribed performance characteristics in the spray formed article thereby assuring that the spray formed article is suitable for intended use;

supplying feed-metal to arc guns that establish the plu-

rality of metal streams; and

selecting the feed-metal so that a first of the metal streams is composed predominantly of zinc metal a second of the metal streams is composed predominantly of non-zinc metal.

[c2] 2. The method of claim 1, further comprising varying the relative proportions during the spraying process and thereby customizing characteristics of the spray article.

[c3] 3. The method of claim 1, wherein the predominantly non-zinc metal stream comprises sufficient amounts of copper to establish the spray formed article as a wear resistant molding form.

[c4] 4. The method of claim 1, wherein the predominantly non-zinc metal stream comprises sufficient amounts of steel to establish the spray formed article as a low-volume stamping tool.

[c5] 5. The method of claim 1, further comprising:

aiming each of the plurality of metal streams at different, but adjacent locations upon the exposed receiving surfaces; and

spacing the different, but adjacent locations on the exposed receiving surfaces sufficiently far apart that a gap-space is maintained between simultaneously sprayed

metal streams.

[c6] 6. The method of claim 5, further comprising:
spraying each of the plurality of metal streams across the exposed receiving surfaces so that discrete metal stripes are formed on the exposed receiving surfaces; and
spacing the metal stripes apart so that parallel and discrete metal stripes with essentially no overlap therebetween are established across the spray formed article.

[c7] 7. The method of claim 6, further comprising:
arranging the parallel and discrete metal stripes into a lattice configuration for minimizing stress-induced shape distortion in the spray formed article, and configuring the lattice configuration so that crossing metal stripes are longitudinally transversely oriented.

[c8] 8. The method of claim 1, further comprising:
controlling application conditions of the plurality of metal streams so that immediately upon striking the exposed receiving surfaces, the metal droplets have a temperature ranging from approximately 32 degrees to 60 degrees Celsius.

[c9] 9. The method of claim 1, further comprising:
controlling metal-feed conditions so that the spray

formed article, on a by-weight basis, comprises between 54 and 60 percent zinc metal and between 40 and 46 percent non-zinc metal, respectively.

[c10] 10. The method of claim 1, further comprising:
aiming each of the plurality of metal streams at different, but adjacent locations on the exposed receiving surfaces;
spacing the different, but adjacent locations on the exposed receiving surfaces so that a segregation interface is established between simultaneously sprayed plurality of metal streams, but there is essentially no overlap between the simultaneously sprayed plurality of metal streams;
spraying each of the plurality of metal streams across the exposed receiving surfaces so that segregated, but interfacing metal stripes are formed on the exposed receiving surfaces;
maintaining an interfacing relationship between the metal stripes so that parallel metal stripes touch one another, but there is essentially no overlap between the metal stripes; and
arranging the parallel metal stripes into a lattice configuration for minimizing stress-induced shape distortion in the spray formed article.

[c11] 11. The method of claim 1, further comprising:
aiming each of the plurality of metal streams at different, but adjacent locations on the exposed receiving surfaces;
spacing the different, but adjacent locations on the exposed receiving surfaces so that an overlapping interface is established between simultaneously sprayed metal streams;
spraying each of the plurality of metal streams across the exposed receiving surfaces so that overlapping metal stripes are formed on the exposed receiving surfaces of the spray formed article;
maintaining an overlapped inter-relationship between the metal stripes so that parallel metal stripes overlap one another; and
arranging the parallel metal stripes into a lattice configuration for minimizing stress-induced shape distortion in the spray formed article.

[c12] 12. The method of claim 1, wherein the article at least partially comprises a pseudo-alloy.

[c13] 13. A spray formed article, the article comprising:
a body comprising a composite main body portion comprising substantially non-randomly distributed particles comprising a first plurality of sprayed metal particles and a second plurality of sprayed metal particles substan-

tially segregate from the first plurality of metal particles, the first plurality of metal particles being composed of a first metal and the second plurality of metal particles being composed of a second metal, different from the first metal, wherein the first metal comprises zinc or zinc- alloy and the second metal comprises a predominantly non-zinc metal.

[c14] 14. The spray formed article of claim 13, wherein the main body portion comprises a psuedo-alloy comprising the first and second plurality of metal particles.

[c15] 15. The spray formed article of claim 13, wherein particles of the first and second plurality of metal particles are commingled but not mixed into an alloy.

[c16] 16. The spray formed article of claim 15, wherein the first metal has a lower melting point than the second metal and wherein the second metal comprises sufficient amounts of copper to establish the spray formed article as a wear resistant molding form.

[c17] 17. The spray formed article of claim 15, wherein the first metal has a lower melting point than the second metal and wherein the second metal comprises sufficient amounts of steel to establish the spray formed article as a low-volume stamping tool.

[c18] 18. The spray formed article of claim 15, further comprising a minor body portion, adjacent the main body portion, the minor body portion substantially comprising the first metal.

[c19] 19. The spray formed article of claim 13, wherein metal particles of the first and second metals are randomly distributed.

[c20] 20. The spray formed article of claim 15, further comprising a composite minor body portion, adjacent the main body portion, the minor body portion comprising substantially segregate, substantially randomly distributed, metal particles of the first and second metal, the minor body portion having a greater ratio of first metal particles to the second metal particles than the ration of first metal particles to the second metal particles in the main body portion.

[c21] 21. The spray formed article of claim 13, wherein at least a portion of the metal particles comprise a first plurality of first stripes being comprised of the first metal and a second plurality of second stripes being comprised of the second metal.

[c22] 22. The spray formed article of claim 21, wherein at least one of the first plurality of metal stripes is adjacent at

least one of the second plurality of second stripes.

[c23] 23. The spray formed article of claim 21, wherein the first plurality of stripes comprises a first matrix of spaced apart stripes and the second plurality of stripes comprises a second matrix of spaced apart stripes, at least a substantial number of the stripes of the second matrix of stripes having a stripe of the first matrix of stripes extending adjacent to and along each side of the stripe of the second matrix of stripes.

[c24] 24. The spray formed article of claim 23, wherein there are discrete gaps extending between the stripes of the first and second matrices.

[c25] 25. The spray formed article of claim 23, wherein there are substantially no discrete gaps extending between the stripes of the first and second matrices.

[c26] 26. The spray formed article of claim 23, wherein there the stripes of the first matrices overlap stripes of the second matrix.

[c27] 27. The spray formed article of claim 21, wherein the lattice configuration is configured such that crossing metal stripes are longitudinally transversely oriented.

[c28] 28. The spray formed article of claim 13, wherein the ar-

ticle comprises a forming tool.

[c29] 29. The spray formed article of claim 13, wherein the particles are held together by mechanical adhesion.

[c30] 30. A method of spray forming an article, said method comprising:

providing a plurality of metal streams of droplets, which upon solidification, form a spray formed article, a first of the streams comprising predominately zinc droplets and a second of the streams comprising predominantly non-zinc droplets; and

controlling the spray conditions so that the droplets in the metal streams remain substantially segregate throughout solidification and form a pseudo-alloy.